

IN THE SPECIFICATION

Please amend the specification as follows:

1. Amend the paragraph on page 2, lines 1-7, as follows:

For this reason, in mobile radio communication, a method is implemented, wherein pilot symbols (also referred to as pilot signals) are periodically inserted between information symbols at the transmitter side, and amplitude/phase variation compensation is performed in the complex baseband, based on the pilot symbol transmitted from the transmitter side, at the receiver side. Conventional communication methods such as this are, for example, described in Non-Patent Reference 1 below.

2. Amend the paragraphs on page 5, line 8, through page 10, line 10, as follows:

In order to attain this foregoing object, the radio communication apparatus of the present invention is one which enables radio communication with communication terminal devices of another party, and comprises: a reception means section for receiving signals transmitted from the communication terminal devices of another party; a channel time variation detection means section for detecting the time variation amount of a channel response using the signals received by the reception

means section; and a pilot signal insertion interval determination means section for determining pilot signal insertion intervals using the detected time variation amount of the channel response.

Through this construction, the pilot signal insertion interval can be determined accurately from the detected result of the time variation amount of the channel response.

Furthermore, the present invention comprises, in addition to the foregoing invention: a pilot signal insertion means section for inserting pilot signals into information signals to be transmitted, based on the pilot signal insertion intervals determined by the pilot signal insertion interval determination means section; and a transmission means section for transmitting the information signals into which pilot signals have been inserted to a radio communication apparatus of another party.

Through this construction, pilot signals can be inserted in pilot signal insertion intervals optimum for the channel condition, based on the pilot signal insertion intervals determined from the detected result of the time variation amount of the channel response and transmitted, and communication throughput can be improved by eliminating redundant pilot signals.

Still further, the present invention comprises, in addition to the foregoing invention: an information signal division means section for dividing information signals to be transmitted based on the pilot signal insertion intervals determined by the pilot signal insertion interval determination means section; a pilot signal insertion means section for inserting pilot signals into post-division information signals which have been divided by the information signal division means section; and a transmission means section for transmitting the information signals into which pilot signals have been inserted to a radio communication apparatus of another party.

Through this construction, in regards to information signals which have been divided at MAC (Media Access Control) layers, for example, pilot signals can be inserted according to pilot signal insertion intervals optimum for the channel condition at the physical layer (also referred to as PHY) based on the pilot signal insertion interval determined from the detected result of the time variation amount of the channel response and transmitted, and communication throughput can be improved by eliminating redundant pilot signals.

Still further, the present invention comprises, in addition to the foregoing invention: an information signal division means section for dividing information signals to be transmitted; an

information signal processing means section for processing post-division information signals which have been divided by the information signal division means section; an information signal merging means section for merging post-division information signals which have been processed by the information signal processing means section; a pilot signal insertion means section for inserting pilot signals into information signals which have been merged by the information signal merging means section, based on the pilot signal insertion interval determined by the pilot signal insertion interval determination means section; and a transmission method transmitting the information signals into which pilot signals have been inserted to a radio communication apparatus of another party.

Through this construction, in regards to information signals which have been divided at MAC layers, for example, pilot signals can be inserted in pilot signal insertion intervals optimum for the channel condition at the physical layer based on the pilot signal insertion interval determined from the detected result of the time variation amount of the channel response and transmitted, thereby enabling improvement of communication throughput by eliminating redundant pilot signals and further improvement of communication throughput by eliminating intervals

with no signals between packets which are generated when transmitted as divided packets.

Still further, the present invention comprises, in addition to the foregoing invention, a division length determination means section for determining the division length of the information signals in the information signal division means section, and this division length determination means section is constructed to enable determination of information signal division length using the time variation amount of a channel response.

Through this construction, even the division length in MAC division which is performed at the MAC layer can be made to be dependent on the time variation amount of a channel response.

Still further, the present invention comprises, in addition to the foregoing invention: a first information signal division means section for dividing information signals to be transmitted; an information signal processing means section for processing post-division information signals which have been divided by the information signal division means section; an information signal merging means section for merging post-division information signals processed by the information signal processing means section; a second information signal division means section for dividing information signals merged by the information signal merging means section, based on the pilot signal insertion

interval determined by the pilot signal insertion interval determination means section; a pilot signal insertion means section for inserting pilot signals into post-division information signals which have been divided by the second information signal division means section; and a transmission means section for transmitting information signals into which pilot signals have been inserted to a radio communication apparatus of another party.

Through this construction, in regards to information signals which have been divided at MAC layers, for example, pilot signals can be inserted in pilot signal insertion intervals optimum for the channel condition at the physical layer based on the pilot signal insertion interval determined from the detected result of the time variation amount of the channel response, and communication throughput can be improved by eliminating redundant pilot signals.

Still further, the present invention comprises, in addition to the foregoing invention, a division length determination means section for determining the division length of the information signals in the first information signal division means section, and the division length determination means section is constructed to determine the division length of the information

signals by using the time variation amount of the channel response.

Through this construction, even the division length in MAC division which is performed at the MAC layer can be made to be dependent on the time variation amount of the channel response.

Still further, the present invention comprises, in addition to the foregoing invention, a transmission means section for transmitting pilot signal insertion intervals to notify the radio communication apparatus of another party of the pilot signal insertion interval determined by the pilot signal insertion interval determination means section.

Through this construction, the pilot signal insertion interval determined from the detected result of the time variation amount of the channel response can be notified to other radio communication apparatuses.

Still further, in the present invention, in addition to the foregoing invention, the channel time variation detection means section is constructed so as to detect the time variation amount of the channel response using signals known to both the transmitter side and the receiver side.

Through this construction, a highly accurate detection of the time variation amounts of channel responses can be performed

using signals known to both the transmitter side and the receiver side.

Still further, in the present invention, in addition to the foregoing invention, the channel time variation detection means section is constructed so as to detect the time variation amounts of channel responses using signals which are not known to at least one of either the transmitter side or the receiver side.

3. Amend the paragraphs on page 11, line 18, through page 15, line 14, as follows:

Still further, the present invention comprises, in addition to the foregoing invention: an information signal division step for including dividing information signals to be transmitted based on pilot signal insertion intervals determined in the pilot signal insertion interval determination step; a pilot signal insertion means step for including inserting pilot signals into post-division information signals which have been divided in the information signal division step; and a transmission means step for including transmitting the information signals to which pilot signals have been inserted to a radio communication apparatus of another party.

Through this, in regards to information signals which have been divided at MAC layers, for example, pilot signals can be

inserted in pilot signal insertion intervals optimum for the channel at the physical layer based on the pilot signal insertion interval determined from the detected result of the time variation amount of a channel response and transmitted, and communication throughput can be improved by eliminating redundant pilot signals.

Still further, the present invention comprises, in addition to the foregoing invention: an information signal division step for including dividing information signals to be transmitted; an information signal processing step for including processing post-division information signals which have been divided in the information signal division step; an information signal merging step for including merging post-division information signals which have been processed in the information signal processing step; a pilot signal insertion ~~means~~ step for including inserting pilot signals into information signals which have been merged in the information signal merging step, based on the pilot signal insertion intervals determined in the pilot signal insertion interval determination step; and a transmission ~~method~~ step including transmitting the information signals into which pilot signals have been inserted to a radio communication apparatus of another party.

Through this construction, in regards to information signals which have been divided at MAC layers, for example, pilot signals can be inserted in pilot signal insertion intervals optimum for the channel condition at the physical layer based on the pilot signal insertion interval determined from the detected result of the time variation amount of the channel response and transmitted, thereby enabling improvement of communication throughput by eliminating redundant pilot signals and further enhancement of communication throughput by eliminating intervals with no signals between packets which are generated when transmitted as divided packets.

Still further, the present invention comprises, in addition to the foregoing invention, a division length determination step for including determining the division length of the information signals in the information signal division ~~means~~ step using the time variation amount of a channel response.

Through this construction, even the division length in MAC division which is performed at the MAC layer can be made to be dependent on the time variation amount of the channel response.

Still further, the present invention comprises, in addition to the foregoing invention: a first information signal division step for including dividing information signals to be transmitted; an information signal processing step for including

processing post-division information signals which have been divided in the first information signal division step; an information signal merging step for including merging post-division information signals processed in the information signal processing step; a second information signal division step for including dividing information signals merged by the information signal merging step, based on the pilot signal insertion interval determined in the pilot signal insertion interval determination step; a pilot signal insertion step for including inserting pilot signals to post-division information signals which have been divided in the second information signal division step; and a transmission step for including transmitting information signals into which pilot signals have been inserted to a radio communication apparatus of another party.

Through this construction, in regards to information signals which have been divided at MAC layers, for example, pilot signals can be inserted in pilot signal insertion intervals optimum for the channel condition at the physical layer based on the pilot signal insertion interval determined from the detected result of the time variation amount of the channel response, and communication throughput can be improved by eliminating redundant pilot signals.

Still further, the present invention comprises, in addition to the foregoing invention, a division length determination step for including determining the division length of the information signals in the first information signal division step by using the time variation amount of a channel response.

Through this construction, even the division length in MAC division which is performed at the MAC layer can be made to be dependent on the time variation amount of a channel response.

Still further, the present invention comprises, in addition to the foregoing invention, a transmission step for including transmitting pilot signal insertion interval to notify the radio communication apparatus of another party of the pilot signal insertion interval determined by the pilot signal insertion interval determination means step.

Through this construction, the pilot signal insertion interval determined from the detected result of the time variation amount of a channel response can be notified to other radio communication apparatuses.

Still further, in the present invention, in addition to the foregoing invention, the channel time variation detection is ~~constructed so as to detect~~ step detects the time variation amounts of channel responses using signals known to both the transmitter side and the receiver side.

Through this construction, a highly accurate detection of time variation amounts of channel responses can be performed using signals known to both the transmitter side and the receiver side.

Still further, in the present invention, in addition to the foregoing invention, the channel time variation detection means ~~is constructed so as to detect~~ step detects the time variation amounts of channel responses using signals which are not known to at least one of either the transmitter side or the receiver side.

4. Amend the paragraph on page 22, lines 3-8, as follows:

Here, the time variation amount of channel response (the amount of fluctuation of a propagation channel response per unit time) detected by the channel time variation detection section ~~13~~ 3 is explained in detail. When a signal is transmitted from the transmitting station to the receiving station in time t , if the sent signal is $s(t)$, the received signal $r(t)$ can be expressed as:

5. Amend the paragraph on page 23, line 15, through page 24, line 1, as follows:

Time variation amount of channel response is the amount of variation of a channel response per unit time and is one or a

combination of a multiple of (1) to (5) below. The channel time variation detection section 3 performs the calculations for these variation amounts and outputs the calculated results.

(1) variation amount of amplitude of a channel response ...
 dr/dt

(2) variation amount of phase of a channel response ... $d\theta/dt$

(3) variation amount of I-ch of a channel response ... di/dt

(4) variation amount of Q-ch of a channel response ... dq/dt

(5) Doppler frequency ... f_D

(1) and (2) are handled by polar coordinate system (r, θ) , and

(3) and (4) by polar rectangular coordinate system (i, q) .

6. Amend the paragraphs on page 44, line 10, through page 45, line 6, as follows:

As described in the foregoing, according to the present invention, the insertion interval for pilot signals can be determined accurately through detected results of time variation amount of channel response because: a reception ~~means~~ section for receiving signals transmitted from a radio communication apparatus of another party; a channel time variation detection ~~means~~ section for detecting the time variation amount of channel response using the signals received by the reception ~~means~~ section; and a pilot signal insertion interval determination

means section for determining pilot signal insertion intervals using the detected time variation amount of channel response are comprised in a radio communication apparatus.

In addition, pilot signals can be inserted in pilot signal insertion intervals most optimum for the channel condition, based on the pilot signal insertion intervals determined from the detected result of time variation amount of channel response and transmitted, and communication throughput can be improved by eliminating redundant pilot signals because: a pilot signal insertion means section for inserting pilot signals into information signals to be transmitted, based on the pilot signal insertion intervals determined by the pilot signal insertion interval determination means section; and a transmission means section for transmitting the information signals into which pilot signals have been inserted to the radio communication apparatus of another party are further comprised.